

SECTION 11 5311.14

GLOVEBOX GLOVES

LANL MASTER SPECIFICATION

When editing to suit project, author shall add job-specific requirements and delete only those portions that in no way apply to the activity (e.g., a component that does not apply). To seek a variance from applicable requirements, contact the LEM Mechanical POC.

When assembling a specification package, include applicable specifications from all Divisions, especially Division 1, General Requirements.

Information within "stars" is provided as guidance to the author responsible for revising the specification. Delete information within "stars" during editing.

This specification serves as a template. The specification was prepared by an organization operating under a quality assurance program that meets the requirements of 10 CFR 830 (suitable for ML-1 through ML-4 projects). Implementation of this specification requires modification to the specification to meet project-specific requirements. Responsibility for application of this specification to meet project-specific requirements lies with the organization modifying or implementing the specification. The organization modifying the specification shall apply a graded approach to quality assurance based on the management level designation of the project. When this specification is used with nuclear facilities subject to 10 CFR 830, modification to this specification must be performed by an individual or organization operating under a quality assurance program that meets the requirements of that CFR.

This specification is directed in content to the glovebox glove supplier and requires editing for all projects. Contact PM Division for typical modifications.

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Arm-length dry box gloves intended for use in radioactive conditions. This specification defines the technical requirements for straight-sleeved arm-length gloves for use in dry boxes or radiological control gloveboxes.
- B. This specification defines quality assurance provisions as rights reserved by LANL.

Consider accordion- or bellow-sleeved gloves for negative pressure gloveboxes.

1.2 REFERENCES AND REGULATORY REQUIREMENTS

- A. 10 CFR 830.122: Nuclear Safety Management Quality Assurance Criteria

- B. AGS-G001-1998: Guideline for Gloveboxes, American Glovebox Society (1998)
- C. ANSI/ASQC Z1.4: Sampling Procedure and Tables for Inspection by Attributes (1993)
- D. ASME NQA-1: Quality Assurance Program Requirements for Nuclear Facilities
- E. ASTM D120-95: Standard Specification for Rubber Insulating Gloves
- F. ASTM D412-97: Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers—Tension
- G. ASTM D412-98a: Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers—Tension
- H. ASTM D573-88-e1: Standard Test Method for Rubber-Deterioration in an Air Oven (1994)
- I. ASTM D3767-96: Standard Practice for Rubber-Measurement of Dimensions
- J. ASTM F640-79: Standard Test Methods for Radiopacity of Plastics for Medical Use (1994)
- K. ASTM F739-99: Standard Test Method for Resistance of Protective Clothing Materials to Permeation by Liquids or Gases Under Conditions of Continuous Contact
- L. ASTM F1236-96-e1: Standard Guide for Visual Inspection of Electrical Protective Rubber Products
- M. ISO 9000: Quality Management and Quality Assurance Standards-Guidelines for Selection and Use

1.3 DEFINITIONS AND ACRONYMS

- A. Certificate of Conformance: A supplier's certification that is traceable to the shipment, the items, or materials and states that the materials conform in all respects with the purchase order requirements. This certificate is signed or otherwise authenticated by the supplier's authorized representative. The CoC must be signed and authenticated by the responsible person within the manufacturing organization and must certify the conformance of all items shipped to purchase-order requirements.
- B. Prototype Tests: A series of additional tests required to ensure that the manufacturing process that was used provides gloves that conform in all respects to the requirements of this specification. Prototype test results are required whenever a major change is made to the fabrication process, fabrication location, or company organization.
- C. CFR: Code of Federal Regulation
- D. CoC: Certificate of Conformance

- E. HNO₃: Nitric Acid
- F. ISO: International Standard for Standardization
- G. M: Molar
- H. Psi: Pounds per Square Inch
- I. QA: Quality Assurance
- J. QC: Quality Control

1.4 DESIGN REQUIREMENTS

- A. Provide gloves of required thickness, dimension, material, and shape to ensure that gloves:
 - 1. Provide a gas-tight seal to the process enclosure
 - 2. Protect the hands and arms of personnel
 - 3. Permit suitable dexterity for laboratory manipulations and existing glovebox applications
- B. Glove dimensions and thickness shall conform to the specifications defined in Attachment 1.

It is the responsibility of the line management owning the glovebox processes to determine what material is applicable and whether or not it is necessary for the glovebox gloves to be Lead-Loaded. Line management must evaluate extremity doses if unleaded gloves are used. Refer to NMT-AP-035, R0, Glovebox Glove Change-Out Program, which is an administrative procedure for guidance on material selection and applicability. For non-radiological applications, contact LANL Health and Safety Team.

- C. For physical property parameters, including such factors as tensile strength and material electrical continuity (when applicable), refer to Attachments 1 and 2 and Section 2.5.A.2, Normal Testing.

1.5 SUBMITTALS

- A. Comply with LANL Section 01 3300, Submittal Procedures.
- B. Quality Assurance Program
 - 1. Submit a description of their quality assurance program and procedures to LANL for periodic review and when major changes are added.

C. Certificate of Conformance

1. Submit a CoC that is signed or otherwise authenticated by responsible managers within the supplying organization and that certifies the conformance of end-items to order requirements. The CoC includes the following:
 - a. Quality assurance program identification (i.e., quality assurance manual of the supplier that shows how procedures and plans are used to produce gloves, and any revisions to the manual).
 - b. Purchased item identified by model number.
 - c. Purchase order number
 - d. Any approved changes, waivers, or deviations from this specification.

Butyl dry glovebox gloves do not require material continuity and resistance to nitric acid tests.
Lead Equivalency Measurements apply only to lead-loaded gloves. Author to edit, as applicable.

D. Lot Test Results

1. Provide lot test results for the following properties for each shipment:
 - a. Material continuity
 - b. Visual inspection
 - c. Air tightness
 - d. Resistance to nitric acid
 - e. Aging tests
 - f. Results of mechanical properties testing
 - g. Lead Equivalency Measurements (annually)

ASTM F640-79 certification is only necessary for glovebox gloves that are lead-loaded neoprene with a Hypalon™ inner and outer coating. Author to remove reference to ASTM F640-79, as applicable.

2. Certification to applicable portions of the ASTM standards as follows:
 - a. ASTM D120-95
 - b. ASTM F1236-96-e1

c. ASTM F640-79

Prospective or new suppliers are to adhere to the following requirement. Established suppliers that have modified their fabrication process or changed the location of the glove manufacturing process are required to resubmit prototype test results per Section 2.5.A.3, Prototype Testing, with the first shipment of affected gloves. For a list of established suppliers, contact NMT Division.

E. Five Pairs of Gloves and Prototype Test Results

1. Submit 5 pairs of gloves and prototype test results per Section 2.5.A.3, Prototype Testing, that include the mechanical properties described in Attachment 2.
2. Verify compliance with all of the inspection requirements presented in this specification before submitting gloves for acceptance, unless otherwise specified.
3. Verify that the manufacturer has ensured that the shipment of gloves meets test requirements (normal or prototype testing) and that the gloves are free of visual defects that can cause the shipment to be rejected.

F. Maintain Inspection Records

1. Maintain records of inspections for each lot shipment. The records shall provide, for a period of 10 years, objective evidence of conformance of materials and assembly to requirements specified in this specification. When requested, the records are to be accessible to LANL representatives for review.

1.6 QUALITY ASSURANCE

- A. LANL reserves the right for its representatives to visit the manufacturers facilities to survey and evaluate products. The purpose of such visits is to ensure/verify conformance to technical requirements, including quality assurance and test/inspection requirements.
- B. LANL reserves the right to obtain access to the supplier facilities, including sub tier suppliers, vendors, and subcontractors, for review, audit, surveillance, witness, inspection, and/or testing activities by LANL representatives.
- C. Develop, implement, and maintain an approved QA system (including program/plan, procedures, and process control documents) based on appropriate industry consensus standards. Examples of such codes and standards include the following:
 1. ASME NQA-1
 2. ISO 9000

3. 10 CFR 830.122

- D. Notify LANL of any major changes that are made to the QA program description.
- E. All personnel who perform inspection verification shall be qualified/certified in accordance with the approved supplier's quality assurance program/procedures.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Use standard commercial methods for packaging, handling, and delivering gloves.
- B. Use methods during transit that prevent damage to contents from moisture and handling.
- C. Pack 2 pair of gloves fully extended (without folding) in a paperboard carton of sufficient strength and stiffness to protect the gloves from exposure, moisture, or damage prior to installation. A cardboard insert is required in each glove to prevent folding, creasing, or twisting.
- D. To prevent or minimize damage to the packaging and contents, store items indoors or in an equivalent environment. Recommended temperatures are between 65 to 85 degrees F. Gloves are not to be subjected to direct sunlight, excessive moisture, or extreme temperature.

1.8 WARRANTY

Author to specify per contract agreement. Consider that failed contaminated gloves cannot be returned.

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Comply with LANL Section 01 2500, Product Options and Substitutions.

2.2 MANUFACTURERS

- A. Companies specializing in designing and manufacturing the products specified in this section with suitable documented experience of performing similar work.

2.3 MATERIALS

- A. Use only virgin (non-reprocessed) materials.
- B. Use the solvent-dip method to fabricate the gloves.
- C. Neither the inner nor the outer surface can be tacky, gummy, or sticky. Ensure that the inside surface is smooth so that a hand can be easily inserted and removed.

Edit material selection based on determination identified in Section 1.4.

- D. Glove material to be [butyl, Hypalon™, or lead-loaded neoprene with a Hypalon™ inner and outer coating].

2.4 MANUFACTURED UNITS

A. Labeling

- 1. Gloves: Mark each glove on the inside surface, approximately 4 inches from the bead on the side opposite the palm, in a readily readable permanent manner with the following information:
 - a. Manufacturer's name
 - b. Glove type and size
 - c. Date of manufacture, lot, and manufacturer's identification number

Electrical test designation is required for Hypalon™ and lead-loaded neoprene with a Hypalon™ inner and outer coating. Author to edit, as applicable.

- d. Electrical test designation
 - e. Model identification (label) (example: 8B3030)
 - f. "Do Not Reverse"
- 2. Cartons: Mark the end of each individual carton (paired gloves container) with the following information:
 - a. Manufacturer's name
 - b. Complete glove description, including nominal gauge
 - c. Date of electrical test
 - d. Date of manufacture lot, and manufacturer's identification number
 - e. Model identification (label) (example: 8B3030)
- 3. Containers: Mark containers for cartons (shipping containers) with the following information:
 - a. Manufacturer's name
 - b. Month/year of manufacture
 - c. Product description

- d. Model identification (label) (example: 8B3030)
- e. Quantity

2.5 SOURCE QUALITY CONTROL

A. Testing

Prospective or new suppliers are to adhere to the following requirement. Established suppliers that have modified their fabrication process or changed the location of the glove manufacturing process are required to resubmit prototype test results per Section 2.5.A.3, Prototype Testing, with the first shipment of affected gloves.

1. Submit 5 prototype pairs of gloves and prototype test data for LANL inspection, testing, and approval. When an order has been awarded, future shipments of gloves are to be equal in all respects to the tested prototype pairs. Follow-on shipments are to include normal test data. Tests are to be classified as normal or prototype.
2. Normal Testing:
 - a. Conduct normal testing of glove characteristics in accordance with ANSI/ASQC Z1.4. This procedure contains methods of sampling and testing for each lot of finished gloves. Submit test data results for each shipment of gloves to LANL.

Butyl dry glovebox gloves only require visual inspection and aging tests. Lead equivalency measurement is only applicable to Lead-Loaded Neoprene with a Hypalon™ Inner and Outer Coating. Author to remove sections from table, as applicable.

- b. Normal testing includes examination of the following characteristics:

NORMAL TESTING	
TEST TYPE	DESCRIPTION
Visual Inspection	<ul style="list-style-type: none"> Visual inspection is performed following the procedures in Attachment 3 and ASTM F1236-96-e1, which apply to dry box gloves. Visual inspection includes both the outside and the inside surfaces of the glove. After the visual inspection, conduct the material continuity test, if applicable.

TEST TYPE	DESCRIPTION
Material Continuity	<ul style="list-style-type: none"> • Test each glove for material continuity in accordance with ASTM D120-95. • Perform the test at room temperature by filling the glove with fresh tap water and immersing it to 1 inch of the cuff. • Apply the proof test voltage at a low value and raise it at an approximate rate of 500 volts per second. • Depending on the glove thickness and type of material, subject each glove to 5,000 or 10,000 volts DC (see Attachment 1) for not less than 15 seconds.
OR	
Air Tightness (Inflation)	<p>Test each glove for air tightness in accordance with the following:</p> <ul style="list-style-type: none"> • Perform inflation testing at room temperature. • Mount each glove on a glove ring whose diameter corresponds to that of the cuff. • Inflate each glove with 30 mbar (22.5 torr) of pressure (this pressure is enough to maintain the glove in a horizontal position). • Maintain glove under pressure for 1 hour. • Ensure that inflation pressure does not fall more than 15 mbar (11.25 torr) (any declination from horizontal indicates a lack of air tightness in the glove). • Remount and retest each failed glove to verify that poor mounting does not cause the lack of air tightness.
Resistance to Nitric Acid	<ul style="list-style-type: none"> • Test for resistance to HNO₃ permeation testing according to the procedure in ASTM F739-99. • Ensure that the tensile strength of the material does not fall below 85% of its minimum floating value after it has been immersed in room temperature 3M HNO₃ for 24 hours.
Aging Test	<ul style="list-style-type: none"> • Perform aging tests according to the procedure in ASTM D573-88-e1.

TEST TYPE	DESCRIPTION
Lead Equivalency Measurement	<ul style="list-style-type: none"> • Determine the lead equivalency by comparing the thickness of the lead layer to an x-ray of the calibrated lead equivalency step wedge as follows: • Place glove samples and a lead step wedge on an x-ray film, then expose the film. The recommended exposure conditions have a energy of 50-70 kilovolts. • Develop the film and evaluate the images on a densitometer. • Using the density readings, calculate the ratio between the lead-layer thickness of the glove and the lead equivalency. • Use this ratio to determine lead equivalency from the lead layer thickness. • For guidelines on how to conduct lead-equivalency measurements, refer to ASTM F640-79.

3. Prototype Testing

- a. Conduct prototype testing in accordance with the ANSI/ASQC Z1.4. This procedure contains methods for sampling and testing of each shipment of finished gloves to which LANL awards the PO (specific sampling requirement will be documented by PO). These sampling and testing methods are also used when manufacturing processes are changed. Ensure that records of sampling and testing are be available for review at the manufacturer's facility.
- b. In addition to the normal test, ensure that the finished glove material complies with initial testing physical properties listed in Attachment 2. After 7 days of accelerating aging at 158 degrees F, ensure that the gloves fall +/-20% of the original test values for tensile and ultimate elongation.

B. Inspection

1. Before submitting gloves for acceptance, unless otherwise specified, the supplier is responsible for all the inspection requirements presented in this specification. The manufacturer shall ensure that the shipment of gloves meets test requirements (normal or prototype testing) and that the gloves are free of visual defects that can cause the shipment to be rejected.

2. Conduct visual and dimensional inspections to ensure that the product meets the requirements of Attachments 1 and 3. Documentation of these inspections to be maintained at the supplier's facility for at least 10 years. These records are to be available to LANL for review, when requested.
3. Use calibrated equipment when inspecting to measure glove thickness. Accuracy is required to be at least ± 0.001 inch. Procedures within ASTM D3767-96 describe a test method capable of measuring to this accuracy.
4. Dimensional examination protocol:
 - a. Adhere to ASTM D3767-96 and ASTM D120-95 as defined in Attachment 1.
5. Visual examination protocol:
 - a. Visually examine the inside and outside of the glove.
 - b. Adhere to attachment 3.
 - c. Adhere to sections of ASTM F1236-96-e1 that apply to dry box gloves.
6. LANL reserves the right to:
 - a. Inspect and test completed gloves to determine whether they comply with the requirements presented in this specification.
 - b. Submit glove samples to an independent laboratory for testing to determine whether the gloves meet the specified requirements.
 - c. Perform inspections and testing on completed gloves.
 - d. Require source inspection and acceptance of the gloves during fabrication. If this requirement is invoked, the supplier is provided specific instructions in the purchase order.
7. Material Rejection
 - a. Gloves will be rejected by LANL if they fail to conform to all inspection requirements as stipulated in this specification. The manufacturer shall ensure that glove shipments meet test requirements (normal or prototype testing per Section 2.5.A, Testing) and that gloves are free of rejectable visual defects.
 - b. Visual defects identified in Attachment 3 as major may cause a shipment of gloves to be rejected. A minor classification is considered acceptable as long as safety performance of the glove is unaffected.

PART 3 EXECUTION

NOT USED

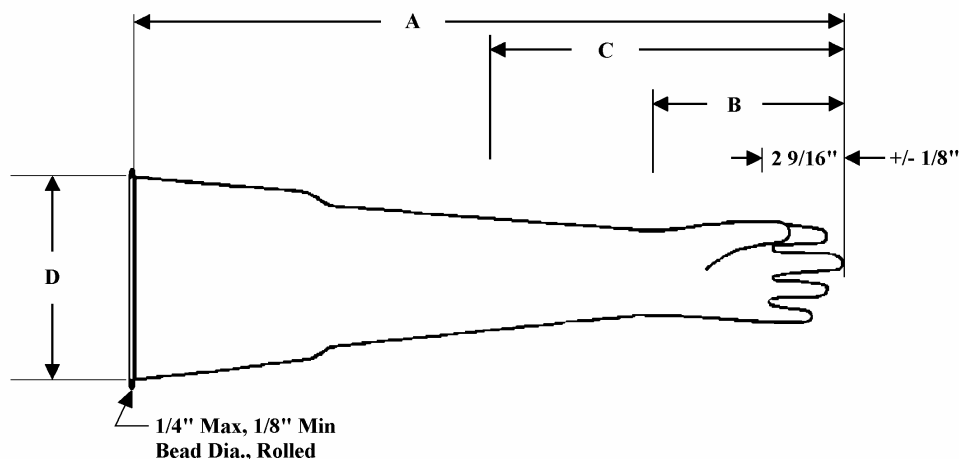
END OF SECTION

Do not delete the following reference information.

FOR LANL USE ONLY

This project specification is based on LANL Master Specification 11 5311.14 Rev. 0, dated January 6, 2006.

SECTION 11 5311.14 – ATTACHMENT 1
ARM LENGTH GLOVE DIMENSIONS



TYPE OF MOLD	A (IN.)	B (AT 7 3/4 IN. DOWN)		C (AT 19 IN. DOWN)		D	
		MIN (IN.)	MAX (IN.)	MIN (IN.)	MAX (IN.)	MIN (IN.)	MAX (IN.)
LANL Mold	30 +/-0.750	9 3/4*	10*	N/A	N/A	7 9/16**	8 1/4**
Standard Manufacturer's Mold Design	32 +/-1.0	9 1/4*	10*	15*	N/A	7 3/4**	8 1/4**

* I.D. Circumference

** Inside Diameter

Use Thickness Measurement tables based on model number and material selection identified in Section 1.4.C. Remove all others.

THICKNESS MEASUREMENT	
MODEL NUMBER	CORRESPONDING THICKNESS (IN.)
8B3030	0.030
8B3032	

THICKNESS MEASUREMENT	
MODEL NUMBER	CORRESPONDING THICKNESS (IN.)
8Y1530	0.015
8Y1532	
8Y3030	0.030
8Y3032	

THICKNESS MEASUREMENT	
MODEL NUMBER	CORRESPONDING THICKNESS (IN.)
8YLY3030	0.030
8YLY3032	

Electrical tests are not required for Butyl Dry Glovebox Gloves. If material selection is Butyl, remove Test Voltage Requirements. Otherwise, select Test Voltage Requirements based on model number(s) and material selection identified in Section 1.4.

TEST VOLTAGE REQUIREMENTS		
MODEL NUMBER	GLOVE THICKNESS (IN.)	MATERIAL CONTINUITY (VOLTS-DC)
8Y15XX	0.015	5,000
8Y30XX	0.030	10,000
NOTE: This test applies only to those gloves that do not contain carbon		

TEST VOLTAGE REQUIREMENTS		
MODEL NUMBER	GLOVE THICKNESS (IN.)	MATERIAL CONTINUITY (VOLTS-DC)
8YLY30XX	0.030	10,000
NOTE: This test applies only to those gloves that do not contain carbon		

SECTION 11 5311.14 – ATTACHMENT 2

Remove material specifications that are not applicable based on material selection identified in Section 1.4.

SPECIFICATIONS FOR 8B3030, 8B3032 BUTYL

GENERAL REQUIREMENTS

Butyl is the base material used in the fabrication of the gloves.

STANDARDS AND REQUIRED REPORTS

Supplier to submit, with each report on lot tests, certification to applicable portions of the two ASTM standards as follows:

ASTM D120-95

ASTM F1236-96-e1

THICKNESS MEASUREMENTS (INCHES)				
THICKNESS	MINIMUM	MAXIMUM 1-INCH SQUARE ON HAND	MAXIMUM 1-INCH SQUARE ON ARM	MAXIMUM AT ANY ONE POINT
0.030	0.022	0.044	0.040	0.050

MECHANICAL PROPERTIES			
PROPERTY	MINIMUM	MAXIMUM	UNITS
Tensile Strength*	1800	N/A	psi
Tension set after 10 minutes at 300% elongation**	0	20	Percent
Ultimate Elongation**	600	N/A	Percent
Accelerated Aging 7 days at 158 °F Tensile Strength Ultimate Elongation	-20 of original -20 of original	+20 of original +20 of original	Percent psi

* Per ASTM D412-98a

** Per ASTM D412-97

SPECIFICATIONS FOR 8Y1530/8Y1532 AND 8Y3030/8Y3032 HYPALON

GENERAL REQUIREMENTS

Hypalon is the base material used in the fabrication of the gloves.

STANDARDS AND REQUIRED REPORTS

Supplier to submit, with each report on lot tests, certification to applicable portions of the two ASTM standards as follows:

ASTM D120-95

ASTM F1236-96-e1

THICKNESS MEASUREMENTS (INCHES)				
THICKNESS	MINIMUM	MAXIMUM 1-INCH SQUARE ON HAND	MAXIMUM 1-INCH SQUARE ON ARM	MAXIMUM AT ANY ONE POINT
0.015	0.012	0.020	0.020	0.025
0.030	0.022	0.044	0.040	0.050

MECHANICAL PROPERTIES			
PROPERTY	MINIMUM	MAXIMUM	UNITS
Tensile Strength*	1900	N/A	psi
Tension set after 10 minutes at 300% elongation**	0	20	Percent
Ultimate Elongation**	500	N/A	Percent
Accelerated Aging 7 days at 158 °F Tensile Strength Ultimate Elongation	-20 of original -20 of original	+20 of original +20 of original	Percent psi

* Per ASTM D412-98a

** Per ASTM D412-97

SPECIFICATIONS FOR 8YLY3030, 8YLY3032 LEAD-LOADED
NEOPRENE, HYPALON™ INNER AND OUTER COATING

GENERAL REQUIREMENTS

Neoprene, lead oxide (red) and Hypalon™ are the base materials used in the fabrication of the gloves. The inner and outer Hypalon™ surfaces are to be devoid of lead oxide (red) and free of penetrations to the neoprene-lead oxide layer. These precautions ensure that the person wearing the glove and the materials and chemicals contacting the glove receive no lead contamination.

LEAD EQUIVALENCE

The nominal shielding power to soft gamma radiation equals that of 0.10-mm thick lead metal foil. Uniformity requirements mandate that there will be no significant working area that contains less than 0.08-mm or more than 0.15-mm lead equivalence, as determined in Section 2.5.A.2.b, Normal Testing, Lead Equivalency Measurement.

STANDARDS AND REQUIRED REPORTS

Supplier to submit lead equivalency reports annually.

Supplier to submit, with each report on lot tests, certification to applicable portions of the three ASTM standards as follows:

ASTM D120-95
ASTM F1236-96-e1
ASTM F640-79

THICKNESS MEASUREMENTS (INCHES)						
THICKNESS	MINIMUM	MAXIMUM 1-INCH SQUARE ON HAND	MAXIMUM 1-INCH SQUARE ON ARM	MAXIMUM AT ANY ONE POINT	INNER HYPALON™ LAYER	OUTER HYPALON™ LAYER
0.030	0.022	0.044	0.040	0.050	0.004 to 0.009	0.006 to 0.013

MECHANICAL PROPERTIES			
PROPERTY	MINIMUM	MAXIMUM	UNITS
Lead Equivalency*	0.08	0.15	Millimeters
Tensile Strength**	1200	N/A	psi
Tension set after 10 minutes at 300% elongation***	0	20	Percent
Ultimate Elongation***	300	N/A	Percent
Accelerated Aging 7 days at 158 °F Tensile Strength Ultimate Elongation	-20 of original -20 of original	+20 of original +20 of original	Percent psi

* Per ASTM F640-79

** Per ASTM D412-98a

*** Per ASTM D412-97

SECTION 11 5311.14 – ATTACHMENT 3

Author to remove sentence addressing “The lead (red) oxide/neoprene...” under “Construction of Workmanship”, examination G, when glove material is not lead-loaded.

VISUAL EXAMINATION			
EXAMINATION	DESCRIPTION	CLASSIFICATION	
		MAJOR	MINOR
1. PAIRING	Gloves not mated in pairs when required by the specification or PO (for example, two left, two right gloves submitted as a pair, or not the same size).	X	
2. COLOR	Spotchy appearance or non-uniform coloration; establishment of a standard color definition for creamy white; evidence of chemical bloom, color splash as defined in ASTM F1236-96-e1.	X	
3. CONSTRUCTION OF WORKMANSHIP			
A	Any cuts, holes, tears, rips, ruptures, nicks, snags, abrasions, or scratches that could impact the standard protective qualities of the glove.	X	
B	Evidence of improper finishing, such as tacky surfaces, hard spots, lumps, or soft spots.	X	
C	Any repair or patch.	X	
D	Any sharp pinches or creases (any radius less than the thickness of the material in the area of the pinch or crease).	X	
E	Any thin spot, depression, or indentation (any spot that appears to be thinner than the immediate material in the area, if the spot compared to the adjacent area is greater than 3/8-in. in diameter and less than the minimum thickness).	X	
F	Age cracks (surface cracks appear as crazing; detergent cracks formed by residue that is not removed during the cleaning and rinsing of the form or mold before the dipping process).	X	
G	Pitting, pockmarks, skin breaks, or rough glove surfaces greater than 0.060 in. in diameter that visually appear below the minimum glove thickness (the lead (red) oxide/neoprene layer required to be	X	

	encased in the Hypalon™ layers with no exposure allowed).		
H	Depressions or indentations on thumb/finger crotch area (crater-like defects on the glove surface that visually appear below the minimum glove thickness).	X	
I	Marker lines, mold mark, parting line or flash line (a thin line of material that results in a slightly increased gauge compared to the adjacent area).		X
J	Blisters or protuberances (raised surface defects or bulging/swellings that protrude above the surface of the glove).		X
K	Embedded foreign matter greater than 0.060 in. in diameter (a particle of material that has been molded into the finished product and that may appear as a bump when the glove is stretched).	X	
L	Bad bead roll (beads on a glove cuff that have poor general appearance and do not meet size requirements; loose or no adhesion rolls; non-uniform roll),	X	
M	A run (excessive material that runs down usually from the fingers, just after dipping and before the rubber skin is formed that does not increase the thickness greater than three times normal).		X
N	Coagulants/water marks (conditions created from a residue liquid on the form before dipping).		X
O	Any burned spot.	X	
P	Bumps (imperfections on the glove surface caused by bumping against another object and that result in thickness below minimum or above maximum).	X	
Q	Construction not as specified.	X	
4. MARKING			
A	Missing, incorrect, illegible.	X	
B	Misplaced.	X	
C	Height of character not as specified or character not accomplished as specified.		X
D	Not permanent (that is, can be easily rubbed off with a moistened thumb).	X	